SOV/136-58-6-3/21

New Means for Automatic Testing and Control in Non-ferrous Metallurgy

(Figure 3). For the continuous analysis of hydro-metallurgical solutions, the KB TsMA in 1957 developed (Figure 4) an automatic polarographic concentration-meter, type KAP-225, with a transducer type DAPK-226: this device has been successfully used at the "Elektrotsink" Works for analysing for cadmium in zinc electrolyte and is based on alternating-current polarography. The KB TsMA have developed a series of radioactive methods, particularly for level indication over a wide (type URP) (Figure 5) and a relatively narrow (type URPR) (Figure 6) range. A radioactive density-meter, type PR-150, independent of the mineralogical and size composition of pulp over a wide range has been successfully tested at the Zolotushinskaya obogatitel'naya fabrika (Zolotushinskaya Beneficiation Works) (ranges 1.5-2.5 and 1-2 kg/litre). Work is proceeding on other radioactive meters including a moisture meter, for concentrates and similar materials. Based on/corrosion-resistant, differential, thermo-electric anemometer (electrical circuit proposed by engineers V.A. Drozdov and A.M. Listov), a flowmeter for pure or air-diluted chlorine has been developed by the

Card2/4
3

SOV/136-58-6-3/21

New Means for Automatic Testing and Control in Non-ferrous Metallurgy

KB TsMA; they have also developed an analyser (type GAKh-239) for chlorine which is accurate to ± 3% and these two instruments are to be used in an integrated automation system being devised for the magnesium industry. The KB TsMA have developed an automatic installation for (Figures 7 and 8) controlling a single pump in relation to the liquid level. Another recent activity of this organisation has been the development of the type ATV-229 over-heating protective device (Figure 9) and a twelve-point temperature signalling device (Figure 10). The ATV-229 device is to be produced by the Tsvetmetpribor Works. In collaboration with the Institut gigiyeny truda i profzabo-levaniy AMN SSSR (Institute of Work Hygiene and Occupational Diseases of the AMS USSR), the KB TsMA have developed a device (Figure 11) for continuous measurement and recording of mercury-vapour concentration in air in the range $0.1 - 0.6$ mg/m$^3$. This instrument (IKRP-445) (Figure 11) also gives an alarm signal if the concentration becomes excessive and its range is being extended in both directions.

Card 3/4

3

SOV/136-58-6-8/21

AUTHORS: Feygin, V.I. and Zhiryakov, N.I., Boguslavskiy, I.M.

TITLE: Automation of Rolling Mills in Non-ferrous Metallurgy
(Avtomatizatsiya prokatnykh stanov v tsvetnoy metallurgii)

PERIODICAL: Tsvetnyye Metally, 1958, Nr 6, pp 42 - 52 (USSR)

ABSTRACT: This article deals mainly with work done by the
KB Tsvetmetavtomatika on the automation of the three-high,
hot-rolling mill at the imeni S. Ordzhonikidze Works and
of the reversing cold strip mill at the Kirovskiy zavod
(Kirov Works). The work on the first was carried out with
the participation of B.S. Fradkin, V.S. Morozov and A.A.
Vasil'yeva. This mill rolls mainly billets of type L-62
(115 x 800 x 600 mm) and L-90 (100 x 800 x 350 mm) brass
into coiled strip (4.0 - 6.0 mm thick) or sheet (15 mm
thick), generally in nine passes. The first stage of
automation embraces all the operations, previously carried
out by the operator, all the roller tables, the tilting
lifts, the middle-roll moving mechanism and the screw-down
to a programme, synchronization of the roller speeds with
that of the rolled strip to avoid surface damage. The
operator now merely selects the appropriate programme and
looks after the mechanisms; the arrangement (Figure 3)

Card1/4

Automation of Rolling Mills in Non-ferrous Metallurgy    SOV/136-58-6-8/21

does provide for immediate manual take-over. The authors describe the system in detail and state that experience has shown that the automation had led to some process advantages and a 2% increase in rolling rate; the power of the motor preventing further improvements; almost all occasions of manual take-over were due to outside factors; the scatter in the thickness of the product was 35% less than with manual control. The automation of cold-rolling mills was started at the end of 1956. With the participation of B.M. Avdeyev and S.I. Alimov, the 250 four-high mill for cold-rolling brass from 1 to 0.4 mm at rolling speeds up to 3.5 m/sec has been automated, some original (Ref 4) proposals as well as some made by the TsKB "Elektroprivod" (Ref 5) and TsNIITMash (Ref 6) being used. For the continuous measurement of metal pressure on the rolls, a strip strain gauge (Figure 4) is used, provision being made for calibration directly in the mill, according to a proposal by Ye.S. Rokotyan and I.M. Meyerovich of TsKBMM of TsNIITMash. When the pointer on the indicating instrument reaches the maximal desired value of the pressure, it operates a photo-relay to produce the appropriate change

Card2/4

Automation of Rolling Mills in Non-ferrous Metallurgy

at the stand.  For the continuous thickness control of the strip, the system adopted (Figure 5) is based on two radioactive isotope devices, one before and the other after the mill.  An integrating device (Figure 6) is included in the system to ensure that only sufficiently important changes in thickness operate the control system. For stopping the rolls just before the end of the strip reaches them, a system (Figure 7) based on counters of the number of turns of strip on the coilers is used;  for thicker strip (0.7 mm and over) the metal is allowed to leave the coilers but not the rolls, the control being effected with the aid of a small, type FR-236 photo-relay (Figure 8).  In 1957, the KB TsMA studied the indirect measurement of roll temperature from that of a small volume of air in contact with the rolls.  Model tests have shown an error of $\pm 3$ $^{\circ}$C for an ambient temperature of $20 \pm 5$ $^{\circ}$C.

Card 3/4

Automation of Rolling Mills in Non-ferrous Metallurgy    SOV/136-58-6-8/21

There are 8 figures and 6 Soviet references.

ASSOCIATION:    KB Tsvetmetavtomatika

Card 4/4

14(5)

SOV/127-59-3-9/22

AUTHOR:      Zhiryakov, N.I., Engineer

TITLE:       Comprehensive Installation for the Automation of a
             Number of Single Pumps (Komplektnaya ustanovka
             avtomatizatsii odinochnykh nasosov)

PERIODICAL:  Gornyy zhurnal, 1959, Nr 3, pp 33-36 (USSR)

ABSTRACT:    The Design Office of Tsvetmetavtomatika has developed
             the AIN-62 simplified comprehensive installations for
             the automation of single pumps. The devices are operat-
             ed by 50-60 kw asynchronic motors with a short cir-
             cuited rotor. When a pumping station is being auto-
             mated, each pump is equipped with such a unit with
             DU-1007 level indicators installed to ensure a desired
             alternating switch-in of pumps. The AIN-62 (figure 2)
             is composed of a hermetical control box (figure 1)
             and a contact transmitter of impulses for switching
             the pumps on or off. As desired, it can contain an
Card 1/3     RZN-67 relay (controlling the filling up of pumps

Comprehensive Installation for the Automation of a Number of Single Pumps.

when the water level in the reservoir is lower than the pump axle), RD-70 or RD-75 relays (controlling the pressure in the delivery conduit, when this pressure is more than 1.5 atm), or an RU-16 regulator of water level in the pouring basin with an RZN-68 water level control relay in the pouring basin in all cases of the filling-in of pumps from a pouring basin. A detailed description of the operation of the AIN-62 is given. All the above devices are being serially produced by the Tsvetmetpribor Plant. The AIN-62 installations are especially designed for mines, concentration plants and hydro-metallurgical shops where the humidity is very high (up to

Card 2/3

SOV/127-59-3-9/22

Comprehensive Installation for the Automation of a Number of Single Pumps.

90%).  They are fed from a single-phase a.c. net of 320 or 220 v.  The installations are now in the Degtyarka copper mine. and in the Tyrny-Auz Combine. There is 1 photo and 1 scheme.

ASSOCIATION:   Tsvetmetavtomatika, Moscow

Card 3/3

BOGULAVSKIY, I.M.; ZHIRYAKOV, N.I.; FEYGIN, V.I.

Automation of a reversing mill for cold rolling of nonferrous metals. Sbor.mat.po avtom.proizv.prots.i disp.  no.5:72-93  '60.
(MIRA 14:4)

1. Konstruktorskoye byuro "TSvetmetavtomatika."
   (Rolling mills)        (Automation)

ZHIRYAKOV, Viktor Georgiyevich; YERSHOV, V.V., red.; SHPAK, Ye.G.,
tekhn. red.

[Organic chemistry] Organicheskaia khimiia. Moskva, Gos.
nauchno-tekhn. izd-vo khim. lit-ry, 1961. 380 p.
(MIRA 15:1)

(Chemistry, Organic)

ZHIRYAKOV, Viktor Georgiyevich; ROMM, R.S., red.

[Organic chemistry] Organicheskaia khimiia. Moskva, Khi-
miia, 1965.   423 p.                    (MIRA 18:9)

ZHIRYAKOV, V. G.

ZHIRYAKOV, V. G. -- "Synthesis and Investigation of Certain New Mero-
cyanine Dyes With Substituents in the External Polymethine Chain."  Sub
13 Nov 52, All-Union Sci Res Cinephotographic Inst (NIKFI)
(Dissertation for the Degree of Candidate in Chemical Sciences).

SO:  Vechernaya Moskva January-December 1952

ZHIRYAKOV, V. G.

USSR/Chemistry

Card 1/1

Authors       : Zhiryakov, V. G.; and Levkoyev, I. I.

Title         : Color of certain merocynaine dyes-derivatives of indandione-1, 3.

Periodical    : Zhur. Ob. Khim. 24, Ed. 4,   710-717, April 1954

Abstract      : Synthesized were certain di-, tetra- and hexamethinemerocyanines-
                derivatives of indandione-1, 3 and corresponding tri- and pentamethiner
                anilies.  Investigated spectra                                            
                in mixtures  see b. type                                                  
                                                                                          
                characterized  resultant.                                         ers  y  
                the polymethine chromophore and radical                        ten references.
                2 USSR since 1940;  4 German since 1934; 4 Russian since 1933.  Tables.

Institution   : All-Union Scientific-Research Motion Picture-Photo Institute

Submitted     : November 10, 1953

SOV/2o-12o-5-29/67

AUTHORS:      Zhiryakov, V. G., Levkoyev, I. I.

TITLE:        The Synthesis of 2-Methyl-4,5-Thiophene (2',3') Thiazole
              (Sintez 2-metil-4,5-tiofene (2',3')tiazola)

PERIODICAL:   Doklady Akademii nauk SSSR, Vol. 12o, Nr 5,
              pp. 1o35 - 1o37 (USSR)

ABSTRACT:     The isosterism of the groups -CH-CH- and -S- is well known for
              the thiazole- and pyridine derivatives. It was very interesting
              to observe the degree of isosterism of these groups in the series
              of the benzthiazole- and thiophene-thiazole which have a hetero-
              cyclic basis with condensed rings of thiazole and thiophene. In
              order to obtain the substance mentioned in the title the thio-
              acetyl derivative of the α-aminothiophene which was then oxidized
              by means of iron-ferricyanide was used as a starting point. The
              first attempts of a synthesis of the substance in question failed.
              A crystalline disulfide with a melting point of 107-108° (I) was
              formed. The substance in question was obtained with a yield of
              10% of the theoretically possible beside the mentioned disulfide
              only after the addition of the 2-thioacetyl-amino-thiophene
              solution in a NaOH aqueous solution to a diluted iron ferricyanide
              solution. The obtained base is a colorless oil which gradually

Card 1/2

The Synthesis of 2-Methyl-4,5-Thiophene (2',3') Thiazole    SOV/20-120-5-29/67

turns yellow. It has a boiling point of 102 - 104° /7 mm with
the characteristic smell of the quinoline bases. It forms easily
a picrate, iodine methylate, and ethylate. Table 1 shows that
several constants of the 2-methyl-4,5-thiophene (2',3') thiazole
and of the 2-methyl benzthiazole as well as of their derivatives
are rather similar. There are 1 table and 9 references, 2 of
which are Soviet.

ASSOCIATION:    Vsesoyuznyy nauchno-issledovatel'skiy kino-foto-institut (All
                Union Scientific Research Institute of Photography and Cinemato-
                graphy)

PRESENTED:      February 6, 1958, by I.L.Knunyants, Member, Academy of Sciences,
                USSR

SUBMITTED:      January 30, 1958

1. Benzthiazole--Synthesis    2. Thiophene--Synthesis    3. Sulfur
compounds--Properties

Card 2/2

ZHIRYAKOV,V.G.; LEVKOYEV, I.I.

Synthesis of 2-methyl-4, 5-thiopheno-(2,3)'thiazole. Dokl. AN
SSSR 120 no. 5:1035-1037 Je '58.                    (MIRA 11:8)

1. Vsesoyuznyy nauchno-issledovatel'skiy kino-foto institut.
Predstavleno akademikom I.L.Kununyantsem.
                    (Thiazole)

U S S R .

Cyanine dyes VIII Some 5,5'- and 2,2'-disubstituted thiacarbocyanines I Levkoev L Zhmurova Sveshnikov, and N S Barvin (M. I. Lomonosov Inst.

Fine Chem. Technol., Moscow. Zhur. Obshchel Khim 2, 1263-72 1953 f C A 41 2246k 41 44. 2499a —Heating 53 g p-EtO₂C₆H₄ HNO₃ d 1.51 in 5 hr to 40° followed at 40°, diln with heating slowly

hydrolysis of

H₂O

6-bromobenzmer

among

ext after acidification with Ac

ext after 04 N HₓO EtOH 75

synthetic method based ... were ... ...
$C_{11}H_{15}O_2Et$ o ars. at 140-50 ... and the ... ...
quaternary salts, which were tre ... ... ... ...
desired orthocarboxylic acid ester and heated ... ... at ...
5°, the product taken up in EtOH and treated with a l
soln. to yield the following thiacarbocyanine iodides (...b-
stituents given): *3,3'-diethyl-5,5'-diethoxy*, green, decomp
290°; *3,3'-diethyl-9-methyl-5,5'-diethoxy* green, decomp
254°, *3,3' ?-...th, 6,5,'-diethoxy*, gre ... ... ... ...
*3,3'-dimethyl-9-ethyl 5,5'-diethoxy*, red, dec ... ... 2' 1 ·
*diethyl-6,6'-diethoxy*, green, decomp. 250°, *3,3' diethyl 9*
*methyl-6,6'-diethoxy*, red-violet, decomp. 265° 3 3' 9-
*triethyl-6,6'-diethoxy*, green, decomp. 240°, *3,3' trimethyl-*
*9-ethyl-6,6'-diethoxy*, red, decomp. 259°, *3,3 methyl-5 5*
*dibenzyloxy*, violet-brown, decomp. 221° 3 3' diethyl 9
*methyl-5,5'-dibenzyloxy* red-brown decomp 222 3 3'
*triethyl-5,5'-dibenzyloxy*, blue-violet decomp 383 3
*diethyl-6,6'-dibenzyloxy*, green, decomp 213° 3 3' methyl
*9-methyl-6,6'-dibenzyloxy*, red-brown decomp 233 3 3' ·
*triethyl 6,6'-dibenzyloxy*, blue, decomp 217° 3 3 dimethyl
*9-ethyl-6,6'-dibenzyloxy*, red-brown, decomp 224 3 3
*diethyl-5,5'-dicarbethoxymethoxy*, violet decomp 201° 3 3'
*diethyl-9-methyl-5,5'-dicarbethoxymethoxy*, red-brown, de-
comp. 222°; *3,3'-9-triethyl-5,5'-dicarbethoxymethoxy*, blue
decomp 196°, *3,3'-diethyl-6,6'-dicarbethoxymethoxy* green.

methyl-6,6'-dicarbethoxymethoxy  red violet  de  mp  2'
1,3'-diethyl-3,5'-diallyloxy  green  secom.  3'0'
diethyl-6-methyl-3,5'-diallyoxy  green  lecom.  3'
6-triethyl-3,5'-diallyloxy  green  lecom.  3'
1,6'-diallyloxy  green  decom.  3'
4,6-diallyloxy  olet  decom.

following the max. of the ...
dialkoxythiacarbocyanines ...
and in 5, then ...
H, H, 557; H, Me ...; H, Me ...; ...
MeO, H, 78; MeO, H ...; ... Me ...
MeO, ... 6; MeO, ... ...
510, Me 566; EtO, Me ...; ... Me ...
PhCH₂O, H, 578; PhCH₂O, H, 572; PhCH₂O, Me ...
PhCH₂O, Me 580; PhCH₂O, Et 564; PhCH₂O, Et ...
EtO₂CCH₂O, H, 575; EtO₂CCH₂O, H, 570; EtO₂CCH₂O
Me 558; EtO₂CCH₂O, Me 556; EtO₂CCH₂O, Et 561,
EtO₂CCH₂O, Et 563; CH₃CHCH₂O, H, 578, CH₃
CHCH₂O, H, 572, CH₃CHCH₂O, Me 558, CH₃CHCH₂O,
Me 559, CH₃CHCH₂O, Et ...; CH₃CHCH₂O, Et ...
HO₂CCH₂O, H ...; HO₂CCH₂O, H, 572, HO₂CCH₂O, Me
..., HO₂CCH₂O, Me 558, HO₂CCH₂O, Et ..., HO₂CCH₂O
Et ..., HO₂CCH₂O, Et 564; PhO, H ...; PhO, H, 569,
PhO, Me --; PhO, Me -- , PhO, Et - ; PhO, Et 562
The abs. max. (in mμ) of 9-ethyl ... dialkoxy-hiacarbo
cyanines are as follows: 5,5'-disubstituted derivs. with
substituent on the heterocyclic atom shown: H, 542,
OMe 558, OEt 559, 6,6'-disubstituted derivs. with sub-
stituent on the heterocyclic atom shown: H, 542, OMe
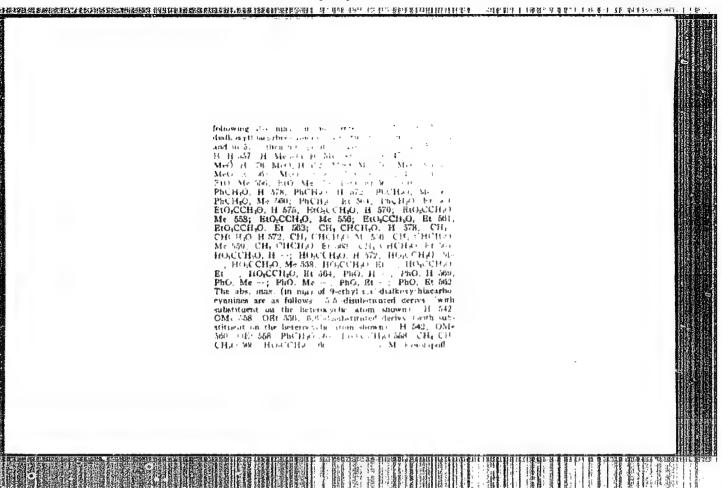560, OEt 568, PhCH₂O ..., EtO₂CCH₂O 564, CH₃CH
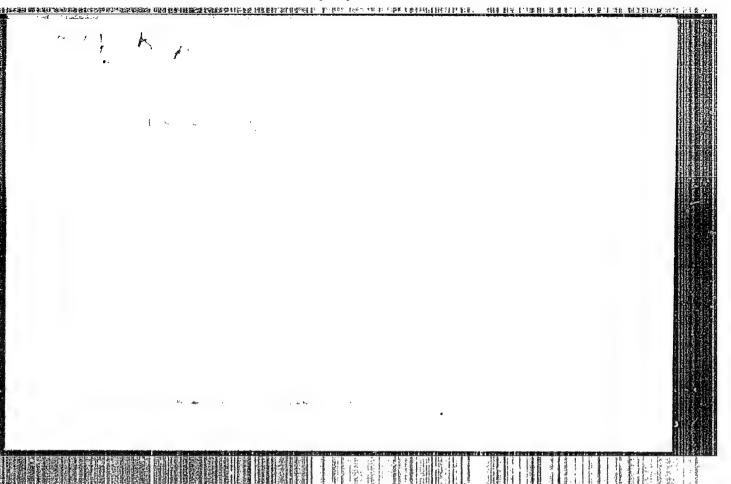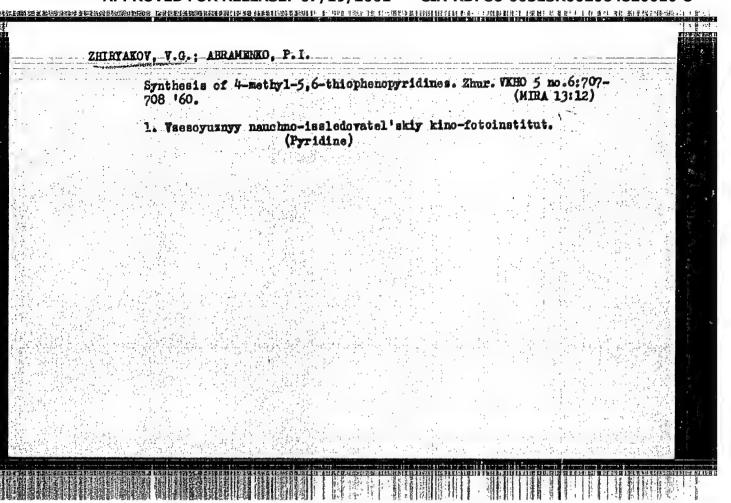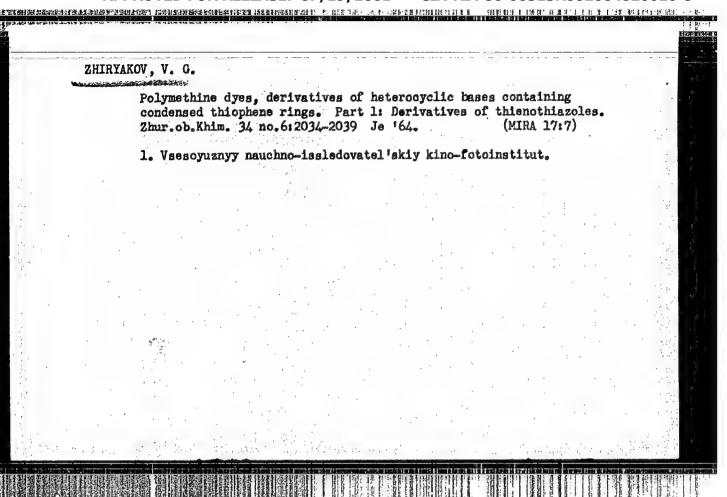CH₂O 566, HO₂CCH₂O ... ..., M. ... off

ZHIRYAKOV, V.G.

Defense of dissertations at the All-Union Research Institute of
Cinematography in 1955.  Zhur. nauch. i prikl. fot. i kin. 1 no.
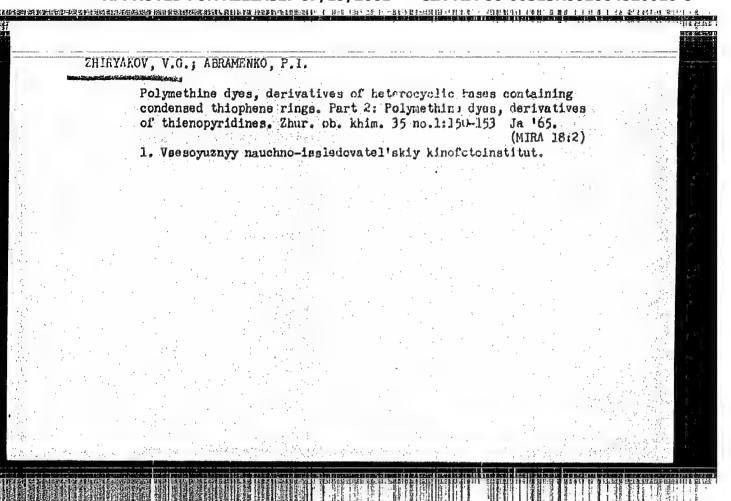4:313-314 Jl-Ag '56.                                    (MLRA 9:10)

(Cinematography)

ZHIRYAKOV, V.G.; ABRAMENKO, P.I.

Synthesis of 4-methyl-5,6-thiophenopyridines. Zhur. VKHO 5 no.6:707-708 '60.    (MIRA 13:12)

1. Vsesoyuznyy nauchno-issledovatel'skiy kino-fotoinstitut.
(Pyridine)

ZHIRYAKOV, V. G.

Polymethine dyes, derivatives of heterocyclic bases containing condensed thiophene rings. Part 1: Derivatives of thienothiazoles. Zhur.ob.Khim. 34 no.6:2034-2039 Je '64.          (MIRA 17:7)

1. Vsesoyuznyy nauchno-issledovatel'skiy kino-fotoinstitut.

ABRAMENKO, P.I.; ZHIRYAKOV, V.G.

Polymethine dyes, derivatives of heterocyclic bases containing condensed thiophene rings. Part 3: Polymethine dyes, derivatives of thionaphthene-4-pyridines. Zhur. org. khim. 1 no.6:1132-1137 Je '65.                                    (MIRA 18:7)
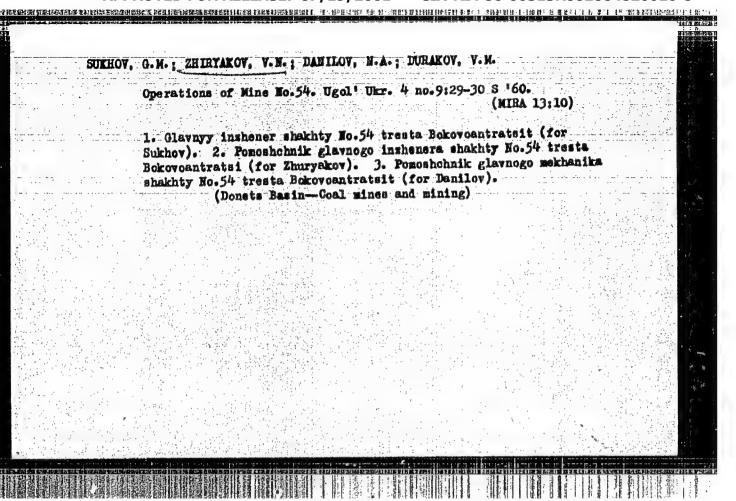
1. Vsesoyuznyy nauchno-issledovatel'skiy kinofotoinstitut (NIKFI).

ZHIRYAKOV, V.G.; ABRAMENKO, P.I.

Polymethine dyes, derivatives of heterocyclic bases containing condensed thiophene rings. Part 2: Polymethine dyes, derivatives of thienopyridines. Zhur. ob. khim. 35 no.1:150-153 Ja '65.

(MIRA 18:2)

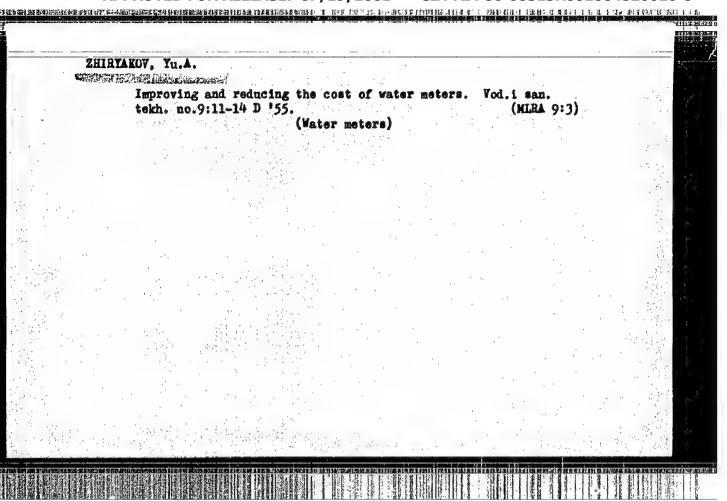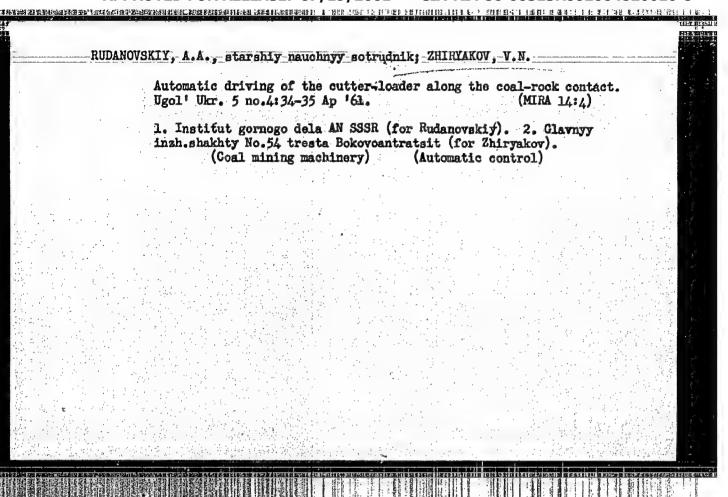1. Vsesoyuznyy nauchno-issledovatel'skiy kinofotoinstitut.

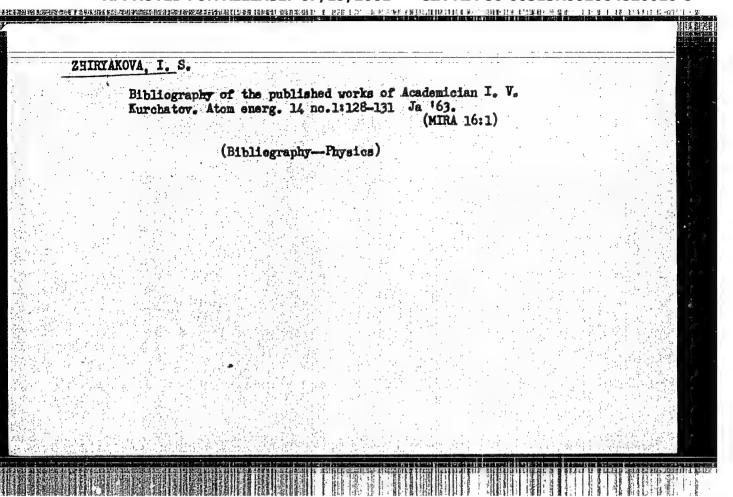SOSNIN, A.G., kand.tekhn.nauk; ZHIRYAKOV, V.N., gornyy inzh.; DANILOV,
N.A., gornyy tekhnik

Operation of the the KLTs-1 belt-and-chain conveyer. Ugol' Ukr.
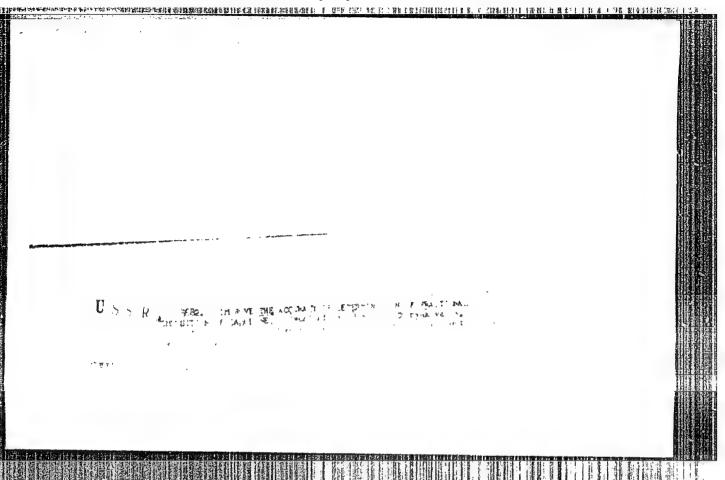5 no,1:40-41 Ja '61.                                      (MIRA 14:1)
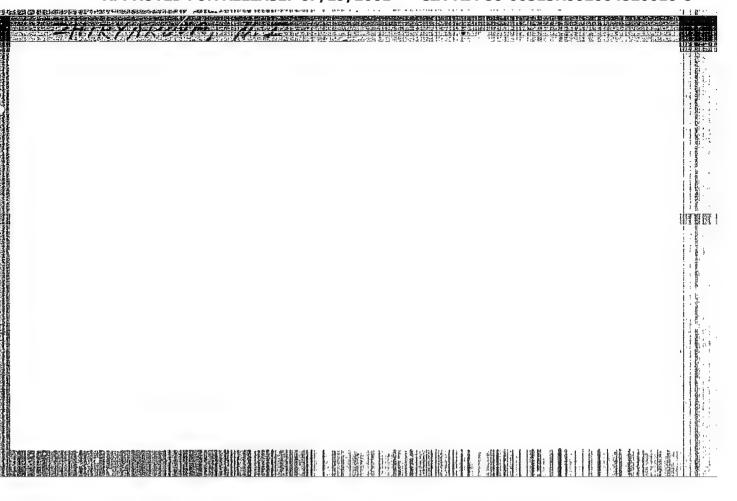            (Conveying machinery)

SUKHOV, G.M.; ZHIRYAKOV, V.N.; DANILOV, N.A.; DURAKOV, V.M.

Operations of Mine No.54. Ugol' Ukr. 4 no.9:29-30 S '60.
(MIRA 13:10)

1. Glavnyy inzhener shakhty No.54 tresta Bokovoantratsit (for
Sukhov). 2. Pomoshchnik glavnogo inzhenera shakhty No.54 tresta
Bokovoantratsi (for Zhuryakov). 3. Pomoshchnik glavnogo mekhanika
shakhty No.54 tresta Bokovoantratsit (for Danilov).
(Donets Basin--Coal mines and mining)

ZHIRYAKOV, Yu.A.

Improving and reducing the cost of water meters.  Vod.i san.
tekh. no.9:11-14 D '55.                              (MLRA 9:3)
                        (Water meters)

RUDANOVSKIY, A.A., starshiy nauchnyy sotrudnik; ZHIRYAKOV, V.N.

Automatic driving of the cutter-loader along the coal-rock contact.
Ugol' Ukr. 5 no.4:34-35 Ap '61.                    (MIRA 14:4)

1. Institut gornogo dela AN SSSR (for Rudanovskiy).  2. Glavnyy
inzh.shakhty No.54 tresta Bokovoantratsit (for Zhiryakov).
      (Coal mining machinery)      (Automatic control)

ZHIRYAKOVA, I. S.

Bibliography of the published works of Academician I. V.
Kurchatov. Atom energ. 14 no.1:128-131  Ja '63.
(MIRA 16:1)

(Bibliography—Physics)

ZHIRYAKOVA, N. I.

AID  P - 1352

Subject     :  USSR/Chemistry

Card 1/1   Pub. 78 - 15/30

Authors    :  Ovchinnikov, B. N. and Zhiryakova, N. I.

Title      :  Increased accuracy of analysis of fractional
              composition of gasoline.

Periodical :  Neft. khoz.,  v.32,  #12,  51-53,  D  1954

Abstract   :  The accuracy of the analysis of the fractional
              composition of gasolines as determined in
              accordance with the standard (GOST 2177-48) is
              discussed.  Experimental parallel analyses in two
              apparatuses indicate that the standard tests can
              produce more accurate results if the limits of
              fractionation temperature are reduced from $4^{o}C$ to
              $2^{o}C$ and $2^{o}$ to   $1^{o}C$ for the end temperatures.
              Three tables.
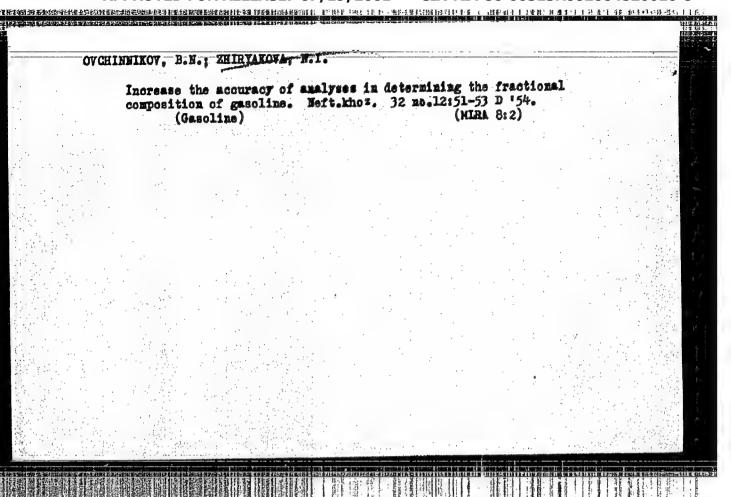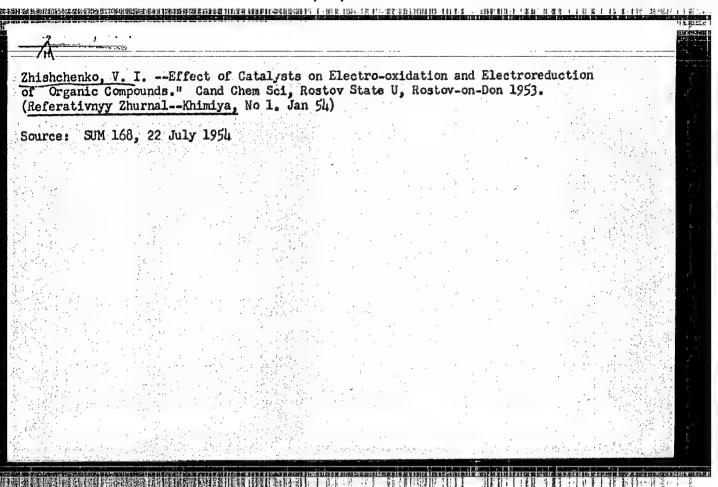
Institution:  None

Submitted  :  No date

OVCHINNIKOV, B.N.; ZHIRYAKOVA, N.I.

Increase the accuracy of analyses in determining the fractional
composition of gasoline. Neft.khoz. 32 no.12:51-53 D '54.
(Gasoline)                                              (MIRA 8:2)

ZHIRYAKOVA, N.P.

Work experience of an interdistrict control worker. Vest.
sviazi 16 no.9:21 S '56.                    (MLRA 9:11)

1. Mezhrayonnyy kontroler Dmitrovskogo i Trosnyanskogo
rayonov Orlovskoy oblasti.
        (Orlov Province--Telecomminication)

GLEYM, V.G.; ZHISHOCHENKO, V.I.; LAVROVA, E.M.; TERESHCHENKO, S.G.
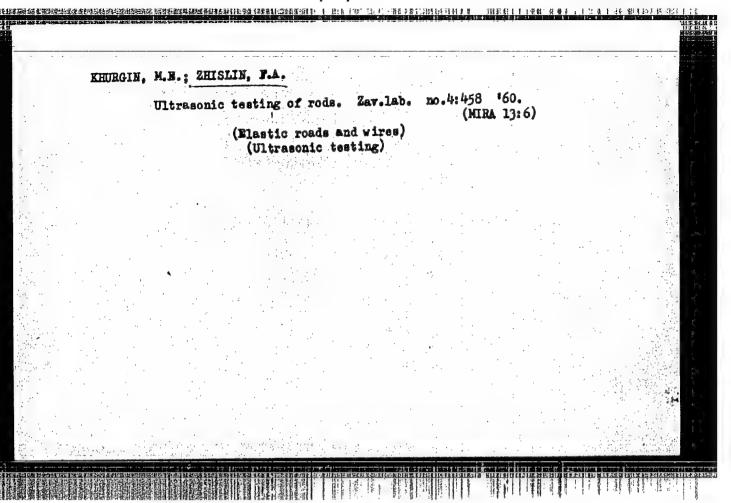
Electrochemical cleaning of petroleum products from the
surface of metal. Izv. vys. ucheb. zav.; neft' i gaz 5
no.1:87-91 '62.                                    (MIRA 16:11)

1. Rostovskiy-na-Domu institut inzhenerov zheleznodorozhnogo
transporta.

ZHISHCHENKO, V.I., kand. khim. nauk

Corrosion of bronze in boiler media with increased multiple
factor of concentration. Trudy RIIZHT no.28:139-147 '59.
(MIRA 16:7)

(Bronze—Corrosion)    (Volovik, M.A.)

Zhishchenko, V. I. --Effect of Catalysts on Electro-oxidation and Electroreduction of Organic Compounds." Cand Chem Sci, Rostov State U, Rostov-on-Don 1953. (Referativnyy Zhurnal--Khimiya, No 1, Jan 54)

Source:  SUM 168, 22 July 1954

KHURGIN, M.B.; ZHISLIN, F.A.

Ultrasonic testing of rods.  Zav.lab.  no.4:458  '60.
(MIRA 13:6)

(Elastic roads and wires)
(Ultrasonic testing)

S/032/60/026/04/17/046
B010/B006

AUTHORS:     Khurgin, M.E., Zhislin, F.A.

TITLE:       Ultrasonic Control of Rods

PERIODICAL:  Zavodskaya laboratoriya, 1960, Vol. 26, No. 4, p. 458

TEXT:  To detect defects in round rods, the ultrasonic contact-echo method
was applied. A device of the type V4-7I and a sound pickup with a beryllium
header were used. In sounding, not only the period from the fading out of the
initial pulse to the occurrence of the first echo from the defect are observed
on the screen, but also the subsequent echoes. The pulse height of the second
and third echoes was found to be larger than that of the first. This is ascribed
to a better focusing of sound waves after the first echo, and to a slighter
dependence of echo pulse heights following the first echo on the angle of
incidence of the sound ray. Since additional echoes occur after the third echo,
only the period preceding the third echo was investigated for production tests.

Card 1/1

20-6-2/47

AUTHOR:     ZHISLIN, G.M.

TITLE:      On the Existence of the Eigenfunctions for the Schrödinger Equation (O sushchestvovanii sobstvennykh funktsiy dlya uravneniya Shredingera)

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol. 117, Nr 6, pp 931-934 (USSR)

ABSTRACT:   Given the Schrödinger equation

$$(1) \quad H\psi = E\psi, \quad H\psi = -\sum_{i=1}^{n} a_i \Delta_i \psi - \sum_{i=1}^{n} b_i \frac{\psi}{r_i} + \sum_{i<j}^{1,n} c_{ij} \frac{\psi}{r_{ij}},$$

where $\psi = \psi(P)$ is the wave function of the system defined in the whole Euclidean $R_{3n}$, $P = P(x_1, \ldots, x_n, y_1, \ldots, y_n, z_1, \ldots, z_n)$ is a point of the $R_{3n}$, $\Delta_i = \frac{\partial^2}{\partial x_i^2} + \frac{\partial^2}{\partial y_i^2} + \frac{\partial^2}{\partial z_i^2}$, $r_i = \sqrt{x_i^2 + y_i^2 + z_i^2}$,

$r_{ij} = \sqrt{(x_i - x_j)^2 + (y_i - y_j)^2 + (z_i - z_j)^2}$ and $a_i, b_i, c_i$ are positive numbers.

Theorem: Let the coefficients of (1) satisfy the inequations

Card 1/2

On the Existence of the Eigenfunctions for the Schrödinger    20-6-2/47
Equation

$$b_i > \sum_{\substack{j \neq i}}^{1,n} c_{ij} \qquad i=1,2,\ldots,n.$$

Then there exists an infinite sequence of eigenvalues of (1);
the multiplicity of every eigenvalue is finite; the eigen-
functions are differentiable arbitrarily often and they satisfy
(1) in every point lying on none of the manifolds $r_i = 0$,

$r_{ij} = 0$ ($i=1,2,\ldots,n$; $1 \leqslant i < j \leqslant n$).

The theorem results as a conclusion of several lemmas and the
results due to Friedrichs [Ref.7].
4 Soviet and 3 foreign references are quoted.

ASSOCIATION: Gor'kiy State University im.N.I.Lobachevskiy (Gor'kovskiy
gosudarstvennyy universitet im.N.I.Lobacheyskogo)
PRESENTED: By V.I.Smirnov, Academician, 21 June 1957
SUBMITTED: 20 June 1957
AVAILABLE: Library of Congress
Card 2/2

SOV/20-122-3-2/57

AUTHOR:    Zhislin, G.M.

TITLE:    On the Spectrum of the Schrödinger Operator (O spektre operatora Shredingera)

PERIODICAL:    Doklady Akademii nauk SSSR, 1958, Vol 122, Nr 3, pp 331-334 (USSR)

ABSTRACT:    The article could not be abstracted because the initial equation in the original text was distorted. Professor A.G. Sigalov was mentioned as the person in charge of the study. There are 5 Soviet references.

ASSOCIATION:    Gor'kovskiy gosudarstvennyy universitet imeni N.I. Lobachevskogo (Gor'kiy State University imeni N.I. Lobachevskiy)

PRESENTED:    May 19, 1958, by V.I. Smirnov, Academician

Card 1/1

16(1)

AUTHOR:     Zhislin, G.M.                              SOV/20-128-2-3/59

TITLE:      A Characteristic of the Spectrum of the Schrödinger Operator
            for Moleoular Type Systems

PERIODICAL: Doklady Akademii nauk SSSR, 1959,Vol 128,Nr 2,pp 231-234 (USSR)

ABSTRACT:   The author considers the nonrelativistio Schrödinger operator
            for a system of n particles:

$$(1) \quad H = - \sum_{i,j=1}^{n} \sum_{\gamma=0}^{2} a_{ij} \frac{\partial^2}{\partial x_{3i-\gamma} \partial x_{3j-\gamma}} + \sum_{i,j=0,i<j}^{n} V_{ij}(\varkappa_{ij}),$$

where $a_{ij} = a_0$ for $i \neq j$; $a_{ii} = a_i + a_0$; $a_i > 0$ arbitrary numbers,
$x_{3i-\gamma}$, $\gamma = 0,1,2$; $i=1,...,n$ - variables of the 3n-dimensional
Euclidean space $R_n$; $\varkappa_{0j} = \varkappa_j = \{x_{3j-2}, x_{3j-1}, x_{3j}\}$, $j \geq 1$;
$\varkappa_{ij} = \varkappa_i - \varkappa_j$, $i,j \geq 1$; $V_{ij}(\varkappa_{ij}) = V_{ji}(\varkappa_{ji})$ real functions
measurable in $R_n$.
Let $\widetilde{H}$ be a selfadjoint extension of H as in $\boxed{\text{Ref 1,2}}$. The
author uses partially results of $\boxed{\text{Ref 1,2}}$. Let

$$(2) \quad \lim_{r_{ij} \to \infty} V_{ij}(\varkappa_{ij}) = 0;$$

Card 1/3

A Characteristic of the Spectrum of the Schrödinger    SOV/20-128-2-3/59
Operator for Molecular Type Systems

$$(3) \qquad V_{ij} \leq 0, \quad i \in S, \quad j \in T$$

and $V_{ij} \geq 0$, $i, j \in S$, $i, j \in T$ everywhere in $R_n$, where $S = \{0, 1, \ldots, p\}$, $T = \{p+1, \ldots, n\}$, $0 \leq p \leq n$; for every $\psi \in W_2^1$ and $E \subseteq R_n$ let

$$(4) \qquad \sum_{i<j}^{n} \int_E |V_{ij}(x_{ij})| \, |\psi|^2 \, d\Omega \leq M_0 \left( \sum_{l=1}^{t} \|\text{grad}\psi\|^{2c_1} \|\psi\|_E^{2d_1} + \|\psi\|_E^2 \right),$$

where $t$, $M_0 > 0$, $c_1 \geq 0$, $d_1 > 0$, $c_1 + d_1 = 1$ are constants not depending on $\psi$ and $E$.

Principal theorem: Let the $V_{ij}$ in (1) satisfy the conditions (2)-(4). Then there exists a $M$, $M \leq 0$, so that the limit spectrum of $H$ is identical with all points of the ray $[M, +\infty)$. For the existence of a discrete spectrum of $H$ it is necessary and sufficient that

$$\inf_{\psi \in Q_0} L[\psi] < M,$$

Card 2/3

A Characteristic of the Spectrum of the Schrödinger     SOV/20-128-2-3/59
Operator for Molecular Type Systems

where $Q_o = \{\psi, \psi \in W_2^1, \|\psi\| = 1\}$.

$$L[\psi] = (\widetilde{H}\psi, \psi) = \sum_{i,j=1}^{n} \sum_{\gamma=0}^{2} a_{ij} \int \frac{\partial \psi}{x_{3i-\gamma}} \frac{\partial \overline{\psi}}{x_{3j-\gamma}} d\Omega +$$

$$+ \sum_{i,j=0, i<j}^{n} \int V_{ij}(r_{ij}) |\psi|^2 d\Omega.$$

The author thanks A.G.Sigalov for giving the problem and M.S. Birman for advice.
There are 2 Soviet references.

ZHISLIN, G. M. Cand Phys-Math Sci -- " Study of the spectrum of the Schroedinger operator." Mos, 1960. (Min of Higher and Specialized Secondary Education RSFSR.

Mos State Univ im M. V. Lomonosov). (KL, 1-61, 179)

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D218/D305

AUTHOR:        Zhislin, G.M. (Gor'kiy)

TITLE:         A study of the spectrum of the Schrödinger operator
               for a many-particle system

SOURCE:        Moskovskoye matematicheskoye obshchestvo. Trudy,
               v. 9, 1960, 81 - 120

TEXT:  The results reported in the present paper were first com-
municated to the Moscow Mathematical Society on April 15, 1958.
The author investigates the spectrum of the following operator for
a system of n particles:

$$H = - \sum_{i,j=1}^{n} \sum_{\gamma=0}^{2} a_{ij} \frac{\partial^2}{\partial x_{3i-\gamma} \partial x_{3j-\gamma}} + \sum_{\substack{i,j=0 \\ i<j}}^{n} V_{ij}(r_{ij}), \qquad (0.1)$$

where $x_{3i} - \gamma$ ($\gamma = 0, 1, 2; i = 1, 2, \ldots, n$) are the coordinates
of a 3n - dimensional Euclidian space $R_n$, $r_{ij} = r_i - r_j$, $r_j =$

Card 1/7

A study of the spectrum of the ...

$\{x_{3j-2}, x_{3j-1}, x_{3j}\}$ $(i, j \geqslant 1)$, $\underline{r}_{oj} = \underline{r}_j$ $(j = 1, 2, \ldots, n)$, $a_{ij} = a_{ji}$ are the coefficients of the positive-definite expression,

$$c_0 = \inf_{\sum_{i=1}^{n} \gamma_i^2 = 1} \sum_{i, j=1}^{n} a_{ij} \gamma_i \gamma_j > 0; \qquad (0.2)$$

and $V_{ij}(\underline{r}_{ij})$ are functions defined in $R_n$. In general these functions have no lower bounds and may possess properties which are not necessarily localized in $R_n$. It is stated that although the above Schrödinger operator is widely used in quantum mechanics, its spectrum for $n \geqslant 2$ has not been studied to any great extent. In the present paper, the author establishes the necessary and sufficient condition for the existence of the discrete spectrum and derives the continuous spectrum of the operator $\hat{H}$ for a system consisting of an arbitrary number of equally charged particles, located in the field of a number of fixed particles of a different sign. The existence of the continuous and discrete spectra is established for a less general class of systems and it is shown that

Card 2/7

A study of the spectrum of the ...

30002
S/550/60/009/000/001/008
D218/D305

if the system under consideration takes the form of an atom, a positive ion or a molecule, then the discrete spectrum of H consists of an enumerable sequence of points. The existence of eigenvalue which lie on the continuous spectrum of H is said to remain uninvestigated. The results now reported were originally published by the author in (Ref. 4: DAN, v. 117, no. 6, 931-934, 1957) and (Ref. 5: DAN, v. 122, no. 3, 1958, 331-334). The present report gives a more detailed account of these results and generalizes them to a larger class of systems. The three theorems which are proved read as follows: Theorem I: Let the function $V_{ij}(\underline{r}_{ij})$ satisfy the conditions

1)

$$\lim_{r_{ij} \to \infty} V_{ij}(\underline{r}_{ij}) = 0 \qquad (1.1)$$

2)  a. $V_{01}(\underline{r}_{01}) \leqslant 0$, b. $V_{ij}(\underline{r}_{ij}) \geqslant 0$ $(i < j; \ 1, \ j = 1, \ 2, \ldots, n)$ (1.2)

3)

$$\int_{x_1^2+x_2^2+x_3^2<N} |V_{ij}(x_1, x_2, x_3)|^2 dx_1\, dx_2\, dx_3 < +\infty \qquad (i < j; \ i, j = 0, 1, \ldots, n), \qquad (1.3)$$

Card 3/7

A study of the spectrum of the ...

30002
S/550/60/009/000/001/008
D218/D305

4) for any function from $W_2^1$ and any region $E \subseteq R_n$

$$\sum_{\substack{i,j=0 \\ i<j}}^{n} \int_E |V_{ij}(r_{ij})| |\psi|^2 \, d\Omega < M_0 \left( \sum_{l=1}^{t_0} \||\operatorname{grad}\psi|\|^{2c_l} \|\psi\|_E^{2d_l} + \|\psi\|_E^2 \right), \tag{1.4}$$

where $M_0 > 0$, $c_l \geqslant 0$, $d_l > 0$, $c_l + d = 1$, $t_0$ are constants which are independent of the choice $\psi$ and E, and $l = 1, 2, \ldots, t$. Then, there exists a number $\mu \leqslant 0$ which is such that the entire continuous spectrum of the operator H consists of all $\lambda \geqslant u$. The necessary and sufficient condition that the discrete spectrum of H should exist is

$$\inf_{\psi \in Q_0} L[\psi] < \mu \tag{1.5}$$

where $L[\psi] = (H\psi, \psi)$, $Q_0 \equiv \{\psi, \psi \in W_2^1, //\psi// = 1\}$. Theorem II: Let the function $V_{ij}(\underline{r}_{ij})$ satisfy the conditions given by (1.1) – (1.4) and suppose further that for any function $\varphi(\underline{r}_1, \ldots, \underline{r}_{i_0-1}, \underline{r}_{i_0+1},$

Card 4/7

A study of the spectrum of the ...

30002
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D218/D305

$\ldots, \underline{r}_n$) from $W_2^1 (R^{(1_0)})$ there exists a real function $g_1(\underline{r}_{1_0})$ from $C_2^f (R^{1_0})$ and numbers $\{k_m\}$, $k_m > 0$ ($m = 1, 2, \ldots$), $k_m \to 0$ when $m \to \infty$; $\alpha$, $0 \leq \alpha < 2$, $\omega_0 > 0$ and $N > 0$, which are such that for $m$ $N$,

a) $\int V_{01}(r_1)|g_{k_m}|^2 d\Omega < -\omega_0 k_m^\alpha \quad (n = 1),$

b) $\sum_{\substack{j=0 \\ j \neq 1_0}}^{n} \int V_{1_0 j}(r_{1_0 j})|\varphi g_{k_m}|^2 d\Omega < -\omega_0 k_m^\alpha \quad (1_0 = 1, 2, \ldots, n; n > 2),$ $\qquad$ (1.6)

where $g_{k_m} = k_m^{3/2} g_1 (k_m \underline{r}_{1_0})$ u $V_{1_0 j}(\underline{r}_{1_0 j}) = V_{j1_0}(\underline{r}_{j1_0})$ when $j < 1_0$.
Then, the lower boundary of the spectrum of H is a point belonging to the discrete spectrum, and the number u defined by Theorem I is negative for $n > 2$. Theorem III: Suppose that in the expression for H

$$V_{1j}(\underline{r}_{1j}) = c_{1j} \frac{1}{\underline{r}_{1j}} (1, j = 1, 2, \ldots, n; i < j), \qquad (1.7)$$

Card 5/7

$$V_{oi}(r_{oi}) = -\sum_{l=1}^{n_o} b_{il} \frac{1}{r_{a_l i}} \quad (i = 1, 2, \ldots, n), \tag{1.7}$$

where $r_{a_l i} = \sqrt{\sum_{\gamma=0}^{2} (x_{3i-\gamma} - a_{3l-\gamma})^2}$; $c_{ij} = c_{ji}$, $b_{li} = b_{il}$, are

any non-negative numbers. Then, there exists a number $\mu \leqslant 0$ which
is such that the entire continuous spectrum of the operator H con-
sists of all numbers $\lambda \geqslant \mu$. Moreover, if

$$\sum_{l=1}^{n_o} b_{il} > 0 \quad npu \ n = 1, \quad uлu \quad \sum_{l=1}^{n_o} b_{il} > \sum_{\substack{j=1 \\ j \neq i}}^{n} c_{ij} \quad (i = 1, 2, \ldots, n; n > 2), \tag{1.8}$$

then the discrete spectrum of H consists of an infinite and increa-
sing sequence of eigenvalues $\lambda_p$ (p = 1, 2, ...), and $\lim_{p \to \infty} \lambda_p = \mu$,

where $\mu = 0$ when $n = 1$, and $\mu < 0$ when $n \geqslant 2$. It is stated that
the notation employed is defined in detail by Ye.F. Zhizhenkova

Card 6/7

A study of the spectrum of the ...

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D218/D305

and the author (Ref. 6: Trudy Mosk. matem. O-va, v. 9, 121-128, 1960). Acknowledgements are expressed to Professor Sigalov who di- rected this work. There are 16 references: 12 Soviet-bloc and 4 non-Soviet-bloc. The references to the English-language publica- tions read as follows: T. Kato, Trans. Amer.Math.Soc. 70, 2, 1951, 212; C.R. Putnam, Quart.Appl.Math. 14, 1, 1956, 101; T. Kato, Comm. pure and appl. math. 10, 2, 1957, 151; T. Kato, Trans.Amer.Math. Soc. 70, 2, 1951, 196;

SUBMITTED: March 7, 1959

Card 7/7

ZHIZHENKOVA, Ye.F.; ZHISLIN, G.M. (Gor'kiy)

Existence of a minimum for some quadratic fuctionals in an
unlimited region. Trudy Mosk.mat.Ob-va 9:121-128 '60.

(Functional analysis)                                (MIRA 13:9)

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AUTHOR:     Zhislin, G. M.

TITLE:      The Problem of Evaluation of the Product of the
            Signal Duration and Its Spectrum Width

PERIODICAL:   Izvestiya vysshikh uchebnykh zavedeniy,
              Radiofizika, 1960, Vol. 3, No. 5, pp. 860 - 865

TEXT:   F  is assumed to be the ensemble of all the real
functions  f(t)  for which:

$$\int_{-\infty}^{+\infty} t^2 f^2(t)dt < +\infty, \quad \int_{-\infty}^{+\infty} f^2(t)dt = 1 \ .$$

If  $f \in F$ ,

$$A(u) = \frac{1}{\pi}\int_{-\infty}^{+\infty} f(t)\cos(ut)dt, \quad B(u) = \frac{1}{\pi}\int_{-\infty}^{+\infty} f(t)\sin(ut)dt \qquad (1).$$

Card 1/4

86860
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E192/E382

The Problem of Evaluation of the Product of the Signal
Duration and Its Spectrum Width

Then, on the basis of the Fourier-Plancherelle theorem:

$$f(t) = \int_0^\infty \left[ A(u)\cos(ut) + B(u)\sin(ut) \right] du \qquad (2).$$

L.I. Mandel'shtam set the problem of evaluating the highest
$\mu$ for which:

$$K = \int_{-\infty}^{+\infty} (t - t_o)^2 f^2(t) dt \int_0^\infty (u - u_o)^2 \left[ A^2(u) + B^2(u) \right] du \geq \mu$$

for all $t_o$, $u_o$ and $f \in F$. This problem is of interest

Card 2/4

86860

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E192/E382

The Problem of Evaluation of the Product of the Signal Duration and its Spectrum Width

in radiophysics and it was solved by A.G. Mayer (Ref. 2) under the assumptions that the function $f_o(t)$ and the number $u_o$ existed. In the following an attempt is made to demonstrate the validity of this assumption. First, it is assumed that $t_o = 0$ and it is shown that the problem consists of determining the existence of a vector $q_o$ which realises the minimum of the function:

$$K[g] = \pi \int_0^\infty \left[ A'^2(u) + B'^2(u) \right] du \int_0^\infty (u - v)^2 \left[ A^2(u) + B^2(u) \right] du$$

which belongs to class $Q$. In this equation $v$ is an arbitrary real number. It is shown that $\mu$ can be expressed by:

Card 3/4

86860

S/141/60/003/005/015/026
E192/E382

The Problem of Evaluation of the Product of the Signal Duration
and its Spectrum Width

$$\mu = \lim_{m \to \infty} K\left[g_m\right] \geq K\left[g_o\right] \qquad\qquad (13)$$

from which it follows that $K\left[g_o\right] = \mu$ .

There are 7 references: 5 Soviet and 2 English.

ASSOCIATION:   Nauchno-issledovatel'skiy radiofizicheskiy
institut pri Gor'kovskom universitete
(Scientific Research Radiophysics Institute
of Gor'kiy University)

SUBMITTED:   June 7, 1960

Card 4/4

S/044/62/000/009/021/069
A060/A000

AUTHOR:      Zhislin, G.M.

TITLE:       Investigation of the spectrum of the Schroedinger operator

PERIODICAL:  Referativnyy zhurnal, Matematika, no. 9, 1962, 53, abstract 9B253
             (In collection "Funktsional'n. analiz i yego primeneniye", Baku,
             AN AzerbSSR, 1961, 65 - 69)

TEXT:   The Schroedinger operator is considered for a system of "n" parti-
cles

$$H = -\sum_{i,j}^{1,n} \sum_{\gamma}^{0,2} a_{ij}^{0} \frac{\partial^2}{\partial x_{3i-\gamma} \partial x_{3j-\gamma}} + \sum_{i<j}^{0,n} V_{ij}(r_{ij}),$$   (1)

where $a_{ii}^{0} = a_i + a_0$, $a_{ij}^{0} = a_0$ for $i \neq j$, $a_i > 0$, $a_0 \geqslant 0$ are arbitrary con-
stants, $V_{ij}(r_{ij})$ are functions measurable in $R_n$. The operator H is taken over
the set $G_H$ of all finite functions twice continuously differentiable in $R_H$. Let

Card 1/4

$\widetilde{H}$ be a self-adjoint continuation in the sense of Friedrichs of the operator $H$ from $G_H$. Let the functions $V_{ij}$ be such that

$$\lim_{r_{ij} \to \infty} V_{ij} \vec{(r_{ij})} = 0, \quad 1 < j, \; i, \quad j = 1, \ldots, n ; \tag{2}$$

for any bounded region $\Omega$ of $R_n$ $\quad \int_\Omega |V_{ij} (r_{ij})|^2 \, d\Omega < +\infty ; \tag{3}$

for any function $\Psi$ from $W_2^{(1)}$ and any region

$$E \subset R_n$$

$$\sum_{1 < j}^{0,n} \int |V_{ij} (r_{ij})| \cdot |\Psi|^2 \, d\Omega \leqslant$$

$$\leqslant M_0 \left( \sum_k^{1,t} \| \operatorname{grad} \Psi \|_E^{2c} k \| \Psi \|_E^{2d} k + \| \Psi \|_E^r \right), \tag{4}$$

Card 2/4

where $M_0 > 0$, $C_k \geqslant 0$, $d_k > 0$, $C_k + d_k = 1$, $t$ is a constant independent of the choice of $\Psi$ and E. Then the following theorems hold: Theorem 1. Let the functions $V_{ij}(r_{ij})$, $i < j$, $i$, $j = 0, 1, \ldots, n$, satisfy the conditions (2) - (4). Then there exists a number $\mu$, $\mu \leqslant 0$, such that the complete limiting spectrum of the operator $\widetilde{H}$ consists of all the numbers $\lambda \geqslant \mu$. For a discrete spectrum of $\widetilde{H}$ to exist, it is necessary and sufficient that $\inf\limits_{\Psi \in Q_0} L[\Psi] < \mu$, where $Q_0 = \{\Psi, \Psi \in W_2^{(1)}, \|\Psi\| = 1\}$,

$$L[\Psi] = (\widetilde{H}\Psi, \Psi) = \sum_{i,j}^{1,n} \sum_{\gamma}^{0,2} a_{ij}^0 \int_{R_n} \frac{\partial \Psi}{\partial x_{3-\gamma}} \frac{\partial \Psi}{\partial x_{31-\gamma}} d\Omega + \int_{R_n} \sum_{i<j}^{0,n} V_{ij}(r_{ij})|\Psi|^2 d\Omega$$

Theorem 2. $V_{ij}(r_{ij}) = \dfrac{c_{ij}}{r_{ij}}$, $i$, $j = 1, \ldots, n$; $i < j$,

$$V_{0j}(r_{0j}) = \sum_{k}^{1,n_0} b_{\xi_k j} \frac{1}{r_{\xi_k j}}, \quad j = 1, \ldots, n,$$

where

Card 3/4

Investigation of the spectrum of the ...

$$r_{\xi_k j} = \sqrt{\sum_{\gamma}^{0,n} (x_{3j-\gamma} - \xi_{3k-\gamma})^2}, \quad c_{ij} = c_{ji}, \quad b_{\xi_k,j} \quad -$$

are arbitrary non-negative numbers. Then there exists a number $\mu \leq 0$ such that the complete limiting spectrum of the operator $\widetilde{H}$ consists of all the numbers $\lambda$, $\lambda \geq \mu$. The proofs are not given.

[Abstracter's note: Complete translation]

Card 4/4

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C 111/ C 333

AUTHOR:     Zhislin, G. M.

TITLE:      On the nodes of the eigenfunctions of the Schrödinger operator

PERIODICAL: Uspekhi matematicheskikh nauk, v. 16, no. 1, 1961, 149-152

TEXT:  Let the Schrödinger equation

$$H\psi = \sum_{\gamma=0}^{2} \sum_{i,j=1}^{n} a_{ij} \frac{\partial^2 \psi}{\partial x_{3i-\gamma} \, \partial x_{3j-\gamma}} + V\psi = \lambda\psi \qquad (1)$$

be given, where $x_{3i-\gamma}$ ($\gamma = 0,1,2$; $i=1,\ldots,n$) are coordinates of the 3n-dimensional Euclidean $R_n$, $a_{ij}$ -- coefficients of a positive definite, quadratic form:

Card 1/4

22409
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C 111/ C 333

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$$V - V_1 = -\sum_{i=1}^{n} \sum_{l=1}^{n_0} \frac{b_{l\alpha_l}}{r_{i\alpha_l}} + \sum_{\substack{i,j=1 \\ i<j}}^{n} \frac{c_{ij}}{r_{ij}} + \sum_{\substack{1,k=1 \\ 1<k}}^{n_0} \frac{c_{\alpha_1 \alpha_k}}{r_{\alpha_1 \alpha_k}}$$

or

$$V \leqq V_2 = -\sum_{i=0}^{p} \sum_{j=p+1}^{n} \frac{b_{ij}}{r_{ij}} + \sum_{\substack{i,j=0 \\ i<j}}^{p} \frac{c_{ij}}{r_{ij}} + \sum_{\substack{i,j=p+1 \\ i<j}}^{p+1,n} \frac{c_{ij}}{r_{ij}}$$

b and c -- nonnegative numbers; $0 \leqq p < n$, $n_0$ -- arbitrary natural numbers

Card 2/4

On the nodes of the ...

22409

S/042/61/016/001/003/007

C 111/ C 333

$$r_{ij} = \sqrt{\sum_{\gamma=0}^{2} (x_{3i-\gamma} - x_{3j-\gamma})^2}, \quad r_{j\alpha_i} = \sqrt{\sum_{\gamma=0}^{2} (\alpha_{3i-\gamma} - x_{3i-\gamma})^2},$$

$\alpha_{3i-\gamma}(\gamma=0,1,2; i = 1,\ldots, n_o)$-- arbitrary real numbers.

Let the operator H be defined on the set $G_H$ of all finite functions twice continuously differentiable in $R_n$, let $\tilde{H}$ be the self-adjoint extension of H. Let the set of the isolated eigenvalues of $\tilde{H}$ with finite multiplicity be denoted as the discrete spectrum of $\tilde{H}$. Let the set of all other points of the spectrum be denoted as the limit spectrum. The point sets of the $R_n$ on which $\psi = 0$ are denoted as nodes of a function $\psi$.

Theorem: Assume that the discrete spectrum of $\tilde{H}$ exists, and that

$$u_1,\ldots, u_k,\ldots \quad (2)$$

be the complete (relative to the closed linear hull of all eigen-functions of $\tilde{H}$) orthogonal normed system of the eigenfunctions of

Card 3/4

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the discrete part of the spectrum of $\tilde{H}$ ; let (2) be ordered in the succession of increasing eigenvalues. Then the nodes of the function $u_k$ can split up the space $R_n$ into not more than k domains.

Corollary: The multiplicity of the smallest eigenvalue of the operator $\tilde{H}$ is = 1.

S. L. Sobolev is mentioned in the paper.

There are 6 Soviet-bloc and 4 non-Soviet-bloc references. The two references to English-language publications read as follows: E. G. Titchmarsh, Eigenfunction expansions associated with second-order differential equations, part II, Oxford, 1958; T. Kato, Comm. on pure and appl.math. 10, No. 2(1957)

SUBMITTED: June 5, 1959

Card 4/4

L 5048-66    EWT(d)    IJP(c)

ACC NR: AP5021514                    SOURCE CODE:  UR/0038/65/029/004/0835/0860

AUTHORS:  Zhislin, G. M.; Sigalov, A. G.                          28

                                                                  B

ORG:  none

TITLE:  On the spectrum of the energy operator in subspaces corresponding to irreducible representations of permutation groups for atoms with stationary nuclei

SOURCE:  AN SSSR. Izvestiya. Seriya matematicheskaya, v. 29, no. 4, 1965, 835-860

TOPIC TAGS:  quantum theory, Schroedinger equation, Coulomb interaction, group theory, electron energy level, differential operator, permutation, eigenvalue

ABSTRACT:  The spectrum of the singular differential operator $H = T_n + V_n + W_n$ is studied, where $T_n$ is the kinetic energy operator for n electrons, $V_n$ is the Coulomb potential of the electrons in the field of an infinitely massive nucleus, and $W_n$ is the sum of the pair Coulomb interaction operators for the electrons. $H$ acts on the Hilbert space of complex-valued functions of 3n independent variables, possessing a definite permutation symmetry.  Applying group-theoretical methods

Card 1/2                                                          UDC: 517.9

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L 5048-66

ACC NR:  AP5021514

of E. Wigner (Teoriya grupi i yeye prilozheniya k kvantovo-mekhanicheskoy teorii atomnykh spektrov, M., IL, 1961) and the theory of partial differential equations, the authors continue earlier investigations of the senior author (Issledovaniye spektra operatora Shredingera dlya sistemy mnogikh chastits, Tr. Mosk. matem. o-vn, t. 9 (1960), 81-120) in spectral theory. The existence of an infinite sequence of proper values is established for every type of physically realizable permutation symmetry. If the symmetry is disregarded, H has an infinite set of isolated proper values converging to some $\mu < 0$. All points to the right of $\mu$ form the "limiting spectrum." Taking account of symmetry, it is found that all (except, possibly, a finite number of the eigenvalues of H) lie in the limiting spectrum if $n \geqslant 4$. The general results obtained are compared with previous work and various special cases. Orig. art. has: 130 formulas.

SUB CODE: MA, TP/  SUBM DATE: 15Jun64/  ORIG REF: 008/  OTH REF: 004

Card 2/2 *plc*

ZHISLIN, G.M.; SIGALOV, A.G.

Mathematical theory of atomic spectra. Dokl. AN SSSR 163 no.2:323-325
Jl '65.                                    (MIRA 18:7)

1. Nauchno-issledovatel'skiy radiofizicheskiy institut pri
Gor'kovskom gosudarstvennom universitete im. N.I.Lobachevskogo.
Submitted January 15, 1965.

ZHISLIN, G.M.

Discreteness condition of the negative spectrum of the Schrödinger operator. Usp. mat. nauk 19 no.6:155-160  N-D '64 (MIRA 18:2)

JIJENKOVA, E.F. [Zhizhenkova, Ye.F.]; JISLIN, G.M. [Zhislin, G.M.]

Existence of the minimum of some quadratic functionals in an indefinite field. Analele mat 16 no.4:98-106  O-D '62.

ZHISLIN, G.M.; SIGALOV, A.G.

Mixed spectrum of certain multidimensional differential operators in quantum mechanics. Dokl. AN SSSR 157 no.6:1329-1331 Ag '64.                                    (MIRA 17:9)

1. Predstavleno akademikom V.I. Smirnovym.

L 13489-66    EWT(d)    IJP(c)

ACC NR:  AP6001672                          SOURCE CODE:   UR/0038/65/029/006/1261/1272

AUTHORS:  Zhislin, G. M.; Sigalov, A. G.

ORG:  none

TITLE:    Some mathematical problems in the theory of atomic spectra

SOURCE:  AN SSSR. Izvestiya. Seriya matematicheskaya, v. 29, no. 6, 1965, 1261-1272

TOPIC TAGS:  atomic spectrum, group theory, mathematic method, Hilbert space,
Hamiltonian

ABSTRACT:  The spectra of the energy operator for atoms is studied mathematically in
subspaces corresponding to irreducible representations of direct products of commuta-
tion, rotation, and inversion groups. The symmetry properties of atomic spectra are
based on the solution of the equation $H\psi = \lambda\psi$ . The three symmetry groups of this
equation are: the commutation group $S_n$; the rotation group $\Re$ ; and the inversion
group $\mathfrak{W}$. If the indices of the irreducible representations of these groups are
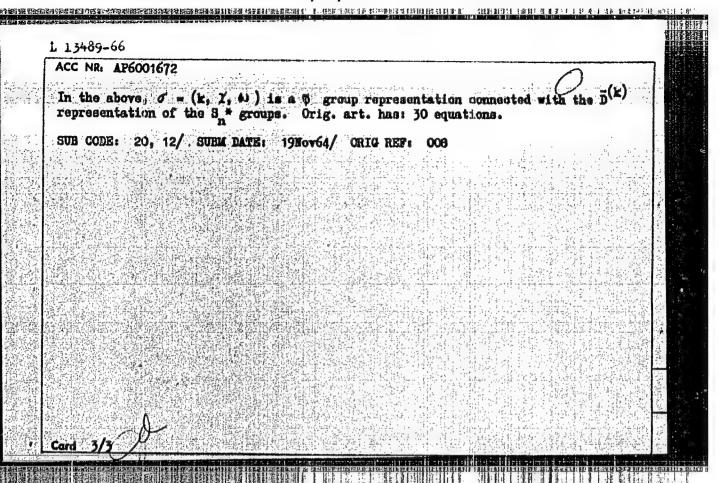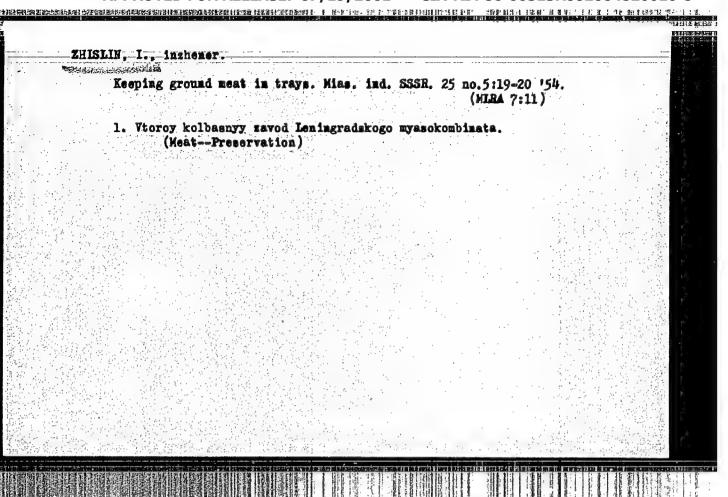denoted by K, $\chi$, $\omega$ respectively, the wave equation has the solution $\psi^{k\chi\omega}$.  The
existence of this equation is proved in the following analysis where the spectrum of
the operator H is investigated in a subspace corresponding to the irreducible
representations of the $S_n$ group. The proof consists of four theorems.  Theorem I
proves that the inequality           $\lambda_0(D_n^k) < \mu_{n-1}^2$

Card  1/3                                                          UDC:  519.4

L 13489-66

ACC NR: AP6001672

always exists; the necessary and sufficient conditions for $\lambda_0(D_n^\sigma)$ to be the point of discrete spectra for $H_n^\sigma$ are

$$\overline{\lambda_0(D_n^\circ)} < \mu_{n-1}^\circ ,$$

and that the point $\lambda \geq \mu_{n-1}^\sigma$ forms the limiting spectrum of the $H_n$ operator.

Theorem II shows that for an irreducible type of symmetry $\sigma$

$$\lambda_0^\circ < \lambda_1^\circ < \ldots < \lambda_{p-1}^\circ \quad (p > 1)$$

the following inequality always holds $\lambda_p(D_n^\circ) < \mu_{n-1}^\sigma$ .

Using theorems I and II, it is then proved that

$$H_{i-1}\varphi^{(i)} = \mu\varphi^{(i)}, \quad i = 1, 2, \ldots, 2l + 1$$

is true if $\mu = \mu_{i-1}^\circ = \lambda_i(D_{i-1}^\circ)$ is the characteristic value of the operator $H_{s-1}$, and that for $\sigma = (k,0,-1)$, $n = 2$, $\varphi_{0,i,i-1}^{i} = 0$, then $\lambda_0^{i,0,i1} < \lambda_0^\sigma$ at $\sigma \neq (0, 0, i+1)$.

Finally, for an arbitrary $\sigma$, if $(\psi_m) \in C_i^1(D_n^\sigma)$, then

$$\int_{R_n} |\psi_m|^2 \, d\Omega + \int_{R_n} |\operatorname{grad} \psi_m|^2 \, d\Omega < C \quad (m = 1, 2, \ldots,)$$

$$\int |\psi_m|^\nu \, d\Omega \to 0 \quad (m \to \infty)$$

for any bounded domain $\Omega \subset R_n$, $\overline{\lim_{m \to \infty} L_n(\psi_m)} > \mu_{n-1}^\sigma$ .

Card 2/3

L 13489-66

ACC NR: AP6001672

In the above, $\sigma = (k, \chi, \omega)$ is a $\bar{g}$ group representation connected with the $\bar{D}^{(k)}$ representation of the $8_n^*$ groups. Orig. art. has: 30 equations.

SUB CODE: 20, 12/ . SUBM DATE: 19Nov64/ ORIG REF: 008

Card 3/3

ZHISLIN, I., inzhener.

Keeping ground meat in trays. Mias. ind. SSSR. 25 no.5:19-20 '54.
(MLRA 7:11)

1. Vtoroy kolbasnyy zavod Leningradskogo myasokombinata.
   (Meat--Preservation)

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SHAPOSHNIKOVA, I.I.; NABOKIN, V.P.; MAKSIMOVA, A.I.;
BOYKO, A.A., red.; LERNER, B.I., red.; MIROSHNICHENKO, V.D.,
red. izd-va; LOMILINA, L.N., tekhn. red.

[Karaganda soil basin; reference book] Karagandinskii ugol'nyi
bassein; spravochnik. Pod obshchei red. A.A.Boiko i B.I.
Lernera. Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po gornomu
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1. Karagandinskiy khimiko-metallurgicheskiy institut Akademii
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        (Karaganda Basin—Coal mines and mining)

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Work practices in the Mine No.31 of the Karagandaugol' Combine.
Ugol' 36 no.2:51-56 F '61.                        (MIRA 14:2)
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UTTS, V.N.; FEDOTOV, I.P.; KHRAPKOV, G.Ye.; SHILENKOV, V.N.;
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[Mining of coal deposits in Kazakhstan] Razrabotka ugol'-
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(MIRA 18:5)

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            anthracosis as independent clin. entity)

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25296 ZHISLIN, S.G.      Presenil'nye Psikhozy I Problema.  Reaktsiy Izmennoy
Pochvy.  Stornik Nauch.  Rabot Psikhiatr, Bol'nitsy IM.  Kashchenko, No.
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1. Institut terapii AMN SSSR, Moskva.
    (CHOLINE)   (SYMPATHIN)   (ADRENALIN)
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Hypertensive crisis and condition of mediatory systems.
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1. Of the Institute of Therapy (Director -- A.L. Myasnikov,
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[The role of the age and somatogenic factor in the origin and
development of certain forms of psychoses] Rol' vozrastnogo i
somatogennogo faktora v vozniknovenii i techenii nekotorykh
form psikhozov. Moskva, Gosudarstvennyi nauchno-issledovatel'-
skii institut psikhiatrii. 1956. 226 p.                    (MIRA 10:5)
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ZHISLIN, S.G. (Moskva)

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(MIRA 13:1)

(ALCOHOLISM,
          alcoholic abstinence synd. (Rus))

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Differentiated therapy in schizophrenia. Zhur. nevr. i psikh. 65
no.2:1507-1516 '65.                                  (MIRA 18:10)

1. Psikhiatricheskaya klinika (zaveduyushchiy - prof. S.G.Zhislin)
Nauchno-issledovatel'skogo instituta psikhiatrii (direktor - prof.
D.D.Fedotov) Ministerstva zdravookhraneniya RSFSR, Moskva.

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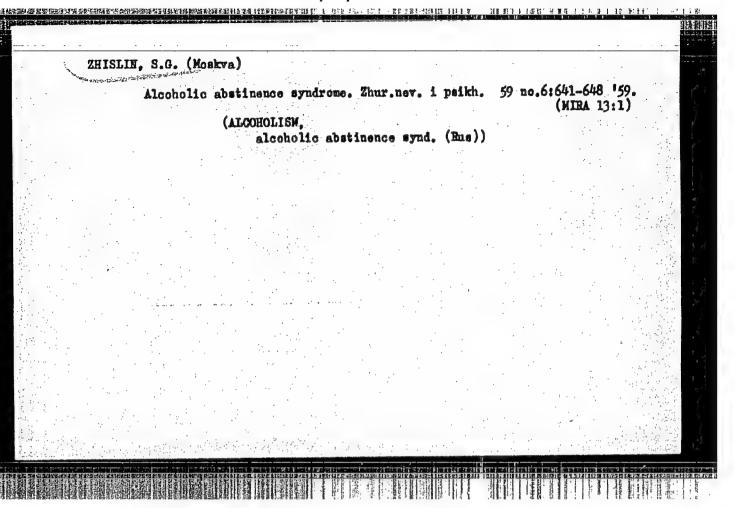
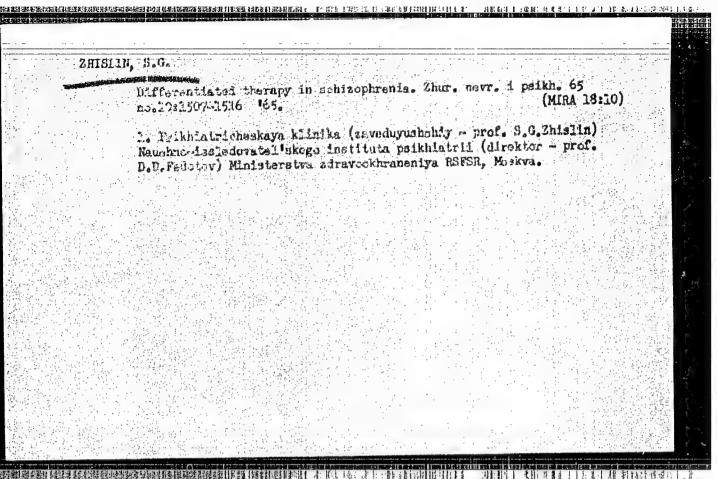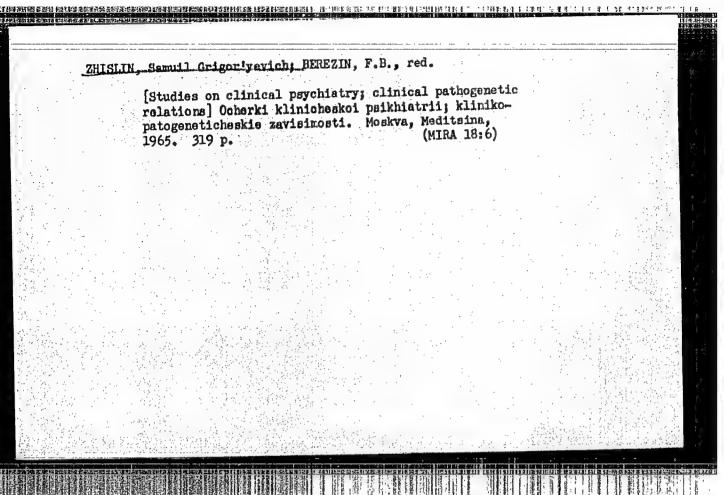ZHISLIN, S.G.; LUKOMSKIY, I.I. (Mockva)

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Some clinical regularities in organic psychoses in old age.
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(SENILE PSYCHOSIS)

ZHISLIN, S.G.

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(PSYCHOTROPIC DRUGS) (PSYCHOSES)

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(MIRA 15:6)

1. Klinika psikhozov pozdnego vozrasta (zav. -- prof. S.G.
Zhislin) Instituta psikhiatrii (dir. - prof. D.D. Fedotov)
Ministerstva zdravookhraneniya RSFSR, Moskva.
(PSYCHOPHARMACOLOGY)